IQ plus® 310A XPCD

Explosion Proof Digital Weight Indicator

Technical/Service Manual

RICE LAKE WEIGHING SYSTEMS
Industrial Solutions on a Global Scale®

ISO 9001 REGISTERED

71784

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About This Manual

The IQ plus 310A XPCD explosion proof digital weight indicator represents the latest in state-of-the-art microprocessor technology specifically applied to the explosion proof weighing marketplace. This IQ plus 310A has been modified for use in a hazardous environment.

This manual provides information on installation of the IQ plus 310A XPCD. The installer should be familiar with the National Electrical Code and RP 12.6 (*Recommended Practice*) requirements for installation of equipment in hazardous areas (NEC Article 504, *Intrinsically Safe Systems*) published through the Instrument Society of America.

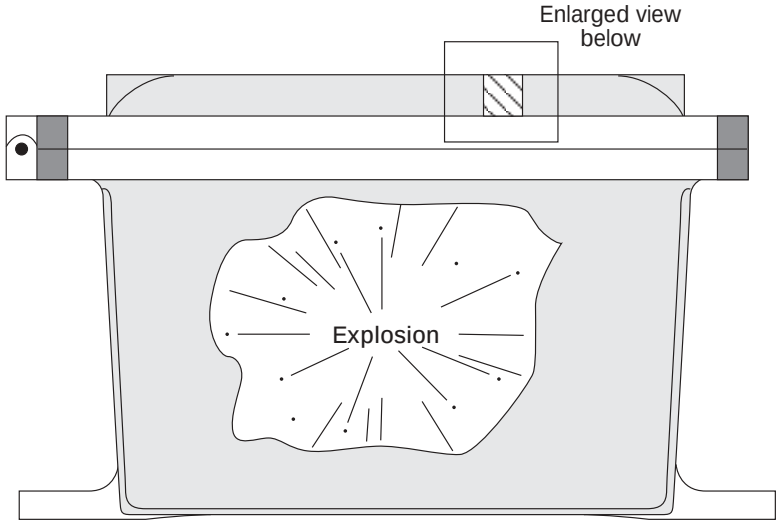
Warning *This equipment is intended only for industrial applications.*

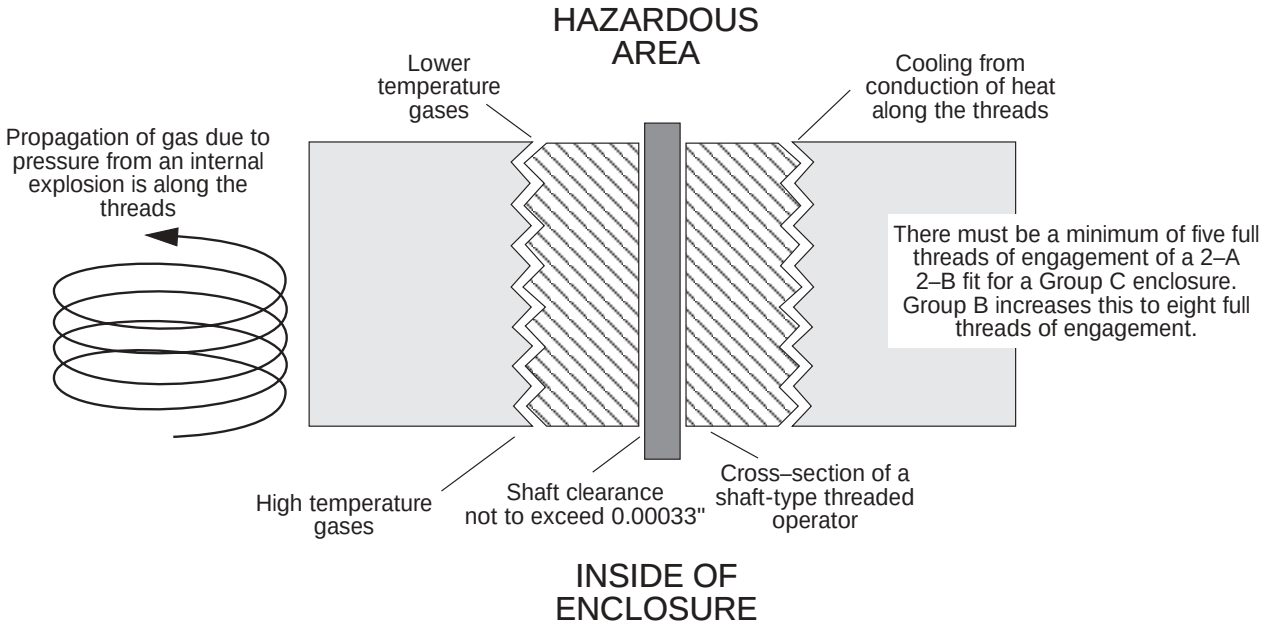
This instrument and accompanying equipment must be installed and serviced by an authorized technician in accordance with the instructions provided in this manual. Improper specification, installation, or service of this equipment could result in personal injury or property damage.

Read all of the manual prior to installation. Do not assume that all hazardous area installations are identical. Do not begin installation until all safety procedures are in place including lockouts, additional ventilation, or washdowns. Make sure plant safety personnel have checked the area in which you will be working and have officially declared it safe for work to proceed.

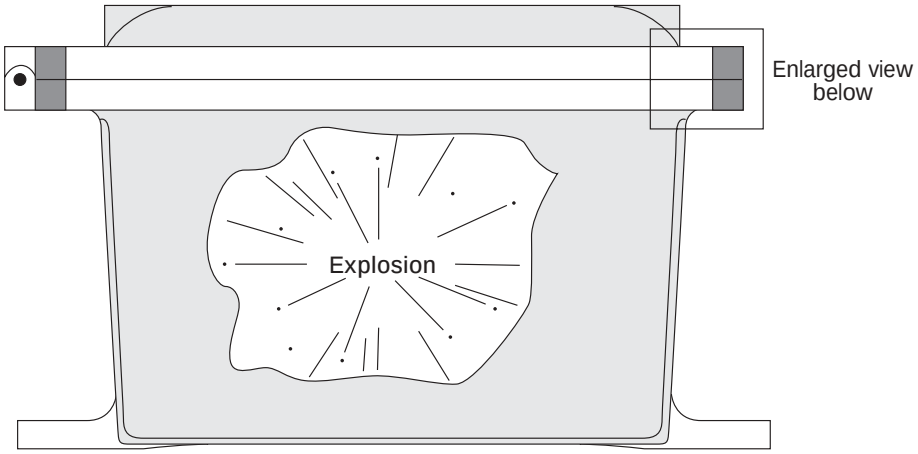
All explosion proof enclosures must remain closed unless being serviced by qualified personnel in an area which safety inspectors have tested and declared safe. Each opening must have a sealoff fitting or plug correctly installed in it. Sealoff installation is critical. Maximum voltage inside of enclosure must not exceed 250VAC.

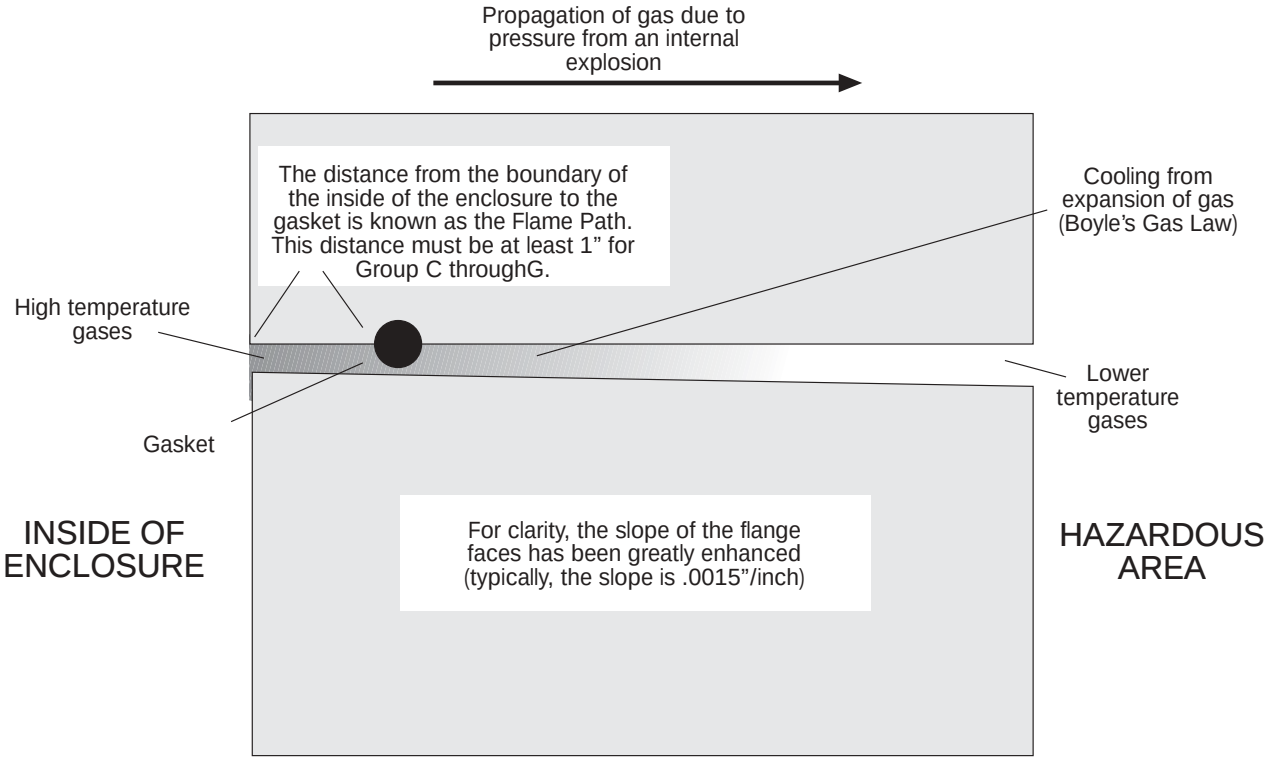
The illustrations shown on the following pages represent a basic explosion proof flame control theory (XPCD).





The push buttons, rotary switches and sealing fittings are all attached to the enclosure via drilled and tapped holes in the enclosure. Just as with the flange, all threaded operators and fittings carefully control the flame path.





The design intent of an explosion proof enclosure is not to contain an explosion, but to control it. The flame path is carefully controlled at the flanges. This insures that if an explosion occurs, any gases that escape will be cooled to a temperature below the ignition point of any atmosphere specified within that enclosure’s rating.

1.0 Introduction

The IQ plus 310A XPCD is a single-channel digital weight indicator designed and approved to operate as an explosion proof system in a wide variety of scale and weighing applications. The indicator is housed in a cast aluminum explosion proof enclosure and can be safely used when the cover is properly installed and the sealing fittings are packed and cemented. The indicator consists of four individual externally mounted buttons for gross/net, tare, units, and print. (see Figure 1-1 on page 5).

Standard features of the IQ plus 310A XPCD include:

- Bright, bold vacuum fluorescent display (VFD)
- 50 updates/second
- Advanced digital filtering
- Two digital inputs, TTL or dry contact closure
- Selectable print data and format, via EDP port
- One communication port; EDP port, RS-232 or 20 mA selectable
- XPCD seal-off kit for three holes
- Cast aluminum explosion proof enclosure Class I, II, III; Divisions I & II, Groups C-G environments

1.1 System Limitations and Restrictions

The following items represent limitations and restrictions on the use of the IQ plus 310A XPCD:

- All wiring, connections, conduit and grounds must comply with the National Electrical Code.
- No modifications can be made in the field.
- It is mandatory to return the IQ plus 310A XPCD to Rice Lake Weighing Systems for service.

1.2 Front Panel Keypad and Annunciators

Figure 1-1 shows the IQ plus 310A XPCD front panel. The IQ plus 310A XPCD front panel consists of 4 individual externally mounted buttons for gross/net, tare, units and print. Table 1-1 lists the button functions.

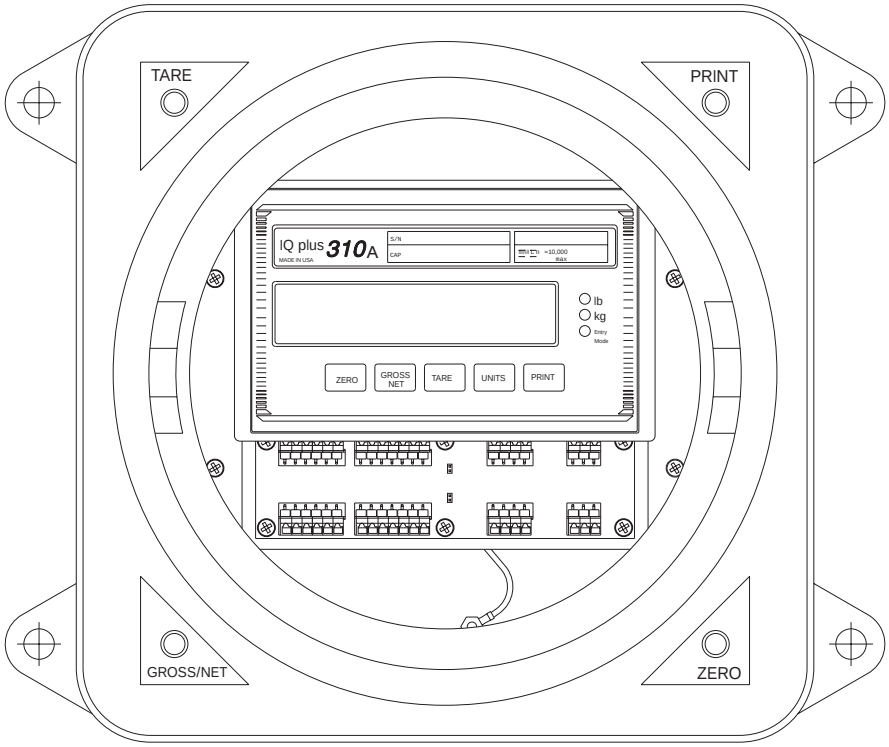


Figure 1-1. IQ plus 310A XPCD Front Panel

Panel Key	Function
ZERO	Provides push-button auto zero (PAZ) over ±1.9% or 100% full scale capacity. Operates only in gross weighing mode.
GROSS/NET	Switches the unit between gross and net weighing modes.
TARE	Provides push-button tare entry over 100% of scale capacity. Pressing TARE key switches to net mode and enters tare.
PRINT	Provides a manual print function if unit is wired to serial printer or other data device. See paragraph 6.6 in the IQ plus 310A Installation and Operation manual, PN 22979, for serial output specifications.

Table 1-1. Front Panel Key Functions

2.0 Installation and Wiring

This section is provided to help the installer and describes the procedures for installing the IQ plus 310A XPCD indicator and enclosure, AC wiring, load cell wiring, conduit runs and internal modifications for the IQ plus 310A XPCD.

2.1 IQ plus 310A XPCD Enclosure

The following sections describe mounting locations and how to mount the enclosure and seal off the fittings.

2.1.1 Mounting and Mounting Locations

The mounting and installation of an explosion proof enclosure is more involved than a general purpose unit and it is recommended that all outdoor installations have a shelter, roof, enclosure, or covering. The IQ plus 310A XPCD enclosure is cast aluminum and direct sunlight can cause it to heat to a very high temperature which can damage the electronics inside. (Such damage is not covered by the warranty). Sheltering the unit from sunlight will help control the internal temperature.

Sunlight and variable temperatures can also cause moisture to condensate inside the enclosure. It is recommended to shelter the outdoor installation by a shelter, roof, enclosure, or covering. Moist environments can also be controlled by the use of desiccants. Contact your local dealer for information on desiccants.

Caution *Do not place desiccants on top of circuit boards. Place them in the bottom of the enclosure away from electronics and wires.*

The explosion proof enclosure is substantially heavier than a standard enclosure and thus the mounting surface must be capable of reliably supporting the added weight.

The mounting and installation of the IQ plus 310A XPCD must be into Division II or safe electrical area per NEC, Section 500. The inside of an explosion proof enclosure is classified as a Division II environment.

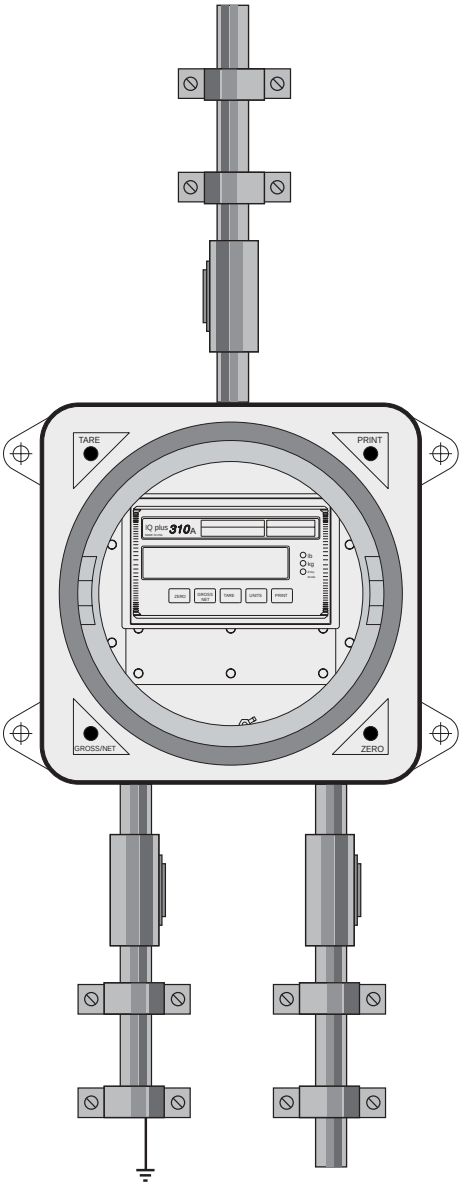
Switches and Glass

The glass and switches on the IQ plus 310A XPCD may look indestructible but they are not. If damaged in any way, the entire unit must be completely turned off at the source until it is replaced. The enclosure must be protected from blows and scrapes from passing equipment, falling objects, thick glues or resins, certain acids which eat aluminum, and other hazards which can break or damage the enclosure.

The glass window in the enclosure must be not become scratched, pitted, or damaged in any way. Do not wipe the glass with dirty gloves or rags as this can cause the glass to become scratched.

2.2 Sealoff Fittings

The utmost care must be taken to completely seal the inside of the enclosure off from the outside world. To do this all wiring into and out of the enclosure must be in conduit using sealoff fittings between the enclosure and the conduit. The sealoff fittings ensure that the hazardous atmosphere does not travel either through the conduit or through insulation or wiring back to the safe area. The graphic shown below illustrates the location of sealoff fittings.



These fittings, once installed and sealed are very difficult to remove so make sure all the wiring has been double checked before beginning. If rigid conduit is not being used for connection to the scale base, be sure to install an approved strain relief fitting to avoid pulling the wires out of the sealoff fittings in an accident. Doing so would open a flame path to the enclosure and defeat its purpose.

2.3 Cabling and Conduit Runs

2.3.1 Cabling

There are two types of cables that pass through a sealoff fitting, single conductor and multi conductor.

Single Conductor Cabling

Single conductor cables are typically redundant ground wires (used with resistive intrinsic safety barrier). Due to the nature of the method by which insulation is applied to wire, a single conductor wire (single or multi strand) can be considered gas tight. It is not necessary to strip the insulation back ahead of entry into the safe area. Single conductor cables will pass through a sealoff fitting as shown below.

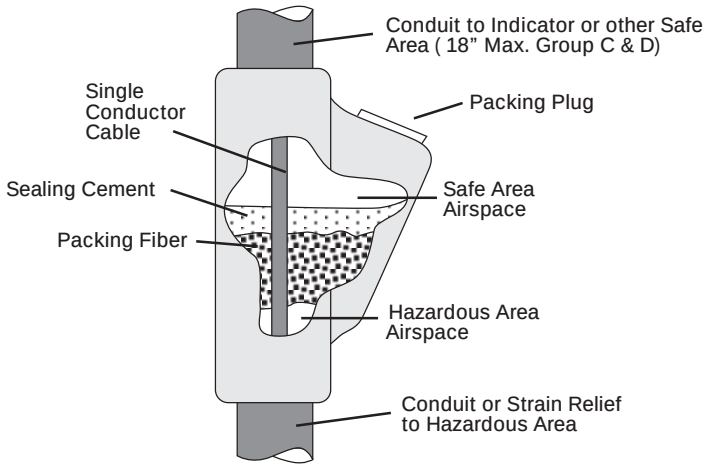

Conduit to Indicator or other Safe Area (18” Max. Group C & D)
Single Conductor Cable
Packing Plug
Sealing Cement
Safe Area Airspace
Packing Fiber
Hazardous Area Airspace
Conduit or Strain Relief to Hazardous Area

Figure 2-1. Single Conductor Cable

Multi Conductor Cabling

Multi conductor cables may be load cell cables, AC power, serial data inputs or other signals. Because of the airspace that typically exists within the outer insulation of a multi conductor cable, they cannot be considered gas tight. Therefore, to insure that the explosion proof enclosure is allowed to vent internal pressure appropriately, the outer insulation must be removed back to the point ahead of entry into the safe area. Multi conductor cables will pass through a sealoff fitting as shown below.

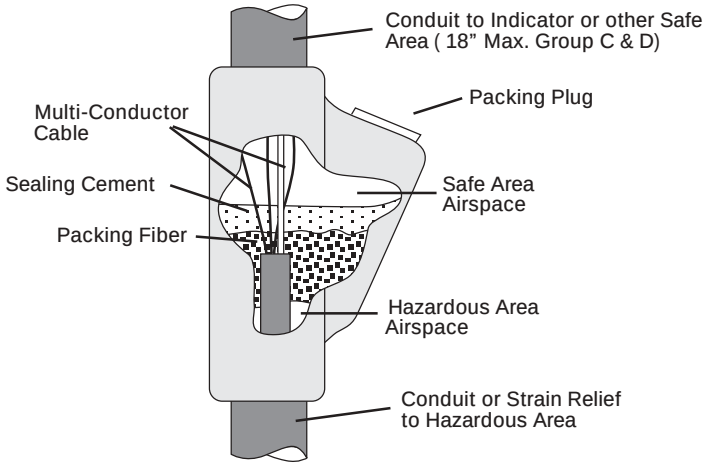

Conduit to Indicator or other Safe Area (18” Max. Group C & D)
Packing Plug
Multi-Conductor Cable
Sealing Cement
Safe Area Airspace
Packing Fiber
Hazardous Area Airspace
Conduit or Strain Relief to Hazardous Area

Figure 2-2. Multi Conductor Cable

A sealing fitting must be installed within 18" of the enclosure for Groups C-G and 6" for Groups A and B.

Using the enclosed packing fiber and sealing cement, follow the directions for sealing the sealoff fittings carefully. Make sure there are no openings, no matter how small to the outside.

Warning *An enclosure without sealoff fittings correctly installed and sealed is not explosion proof therefore can pose serious injury or death.*

2.3.2 Conduit Runs

Conduit can be run either vertically or horizontally. But either way the conduit must be sealed properly to maintain the explosion proof integrity of the unit. The following paragraphs explain the proper way to install a conduit run and the sealing fittings.

Horizontal Conduit Runs

Install the fitting with covered filling opening facing up. Remove the threaded cover and pack Adaco® packing fiber around and between cables at both ends of fitting to block the flow of cement into conduits. Packing fiber must not project into the main cavity of fitting. The cavity length free of packing fiber must be at least equal to inside diameter of conduit but not less than 5/8".

Mix the cement per label instructions using the enclosed shipping container. Fill the container with clean cold water to “water line” (make sure not to exceed required amount of water). Gradually pour cement from the plastic bag into water and stir thoroughly for proper mixture. Fill the fitting in one continuous pour to the top of filling opening within five minutes after mixing cement. Tamp with a blunt stick to expel any air bubbles. Install and tighten filling opening cover.

Fittings requiring more than 16 oz. of cement must be filled from a single mixture of cement and water. Do not pour in stages.

Caution *Water-mix sealing compound should not be poured or installed at temperatures below 35F.*

Vertical Conduit Runs

Install the fitting with angled fill plug or cap fill plug towards the top. Remove angled fill plug, large hole plug or threaded cover. Pack fiber around and between cables at lower end of sealing fitting to block flow of cement into conduit. Packing fiber must not project into main cavity of fitting. Install and tighten large plug or threaded cover with fill plug facing up but do not install fill plugs at this time.

Mix the cement per label instructions using the enclosed shipping container. Fill the container with clean cold water to “water line” (make sure not to exceed required amount of water). Gradually pour cement from the plastic bag into water and stir thoroughly for proper mixture. Fill the fitting in one continuous pour to the top of filling opening within five minutes after mixing cement. Tamp with a blunt stick to expel any air bubbles. Install and tighten fill plug.

2.4 AC Power Wiring

Electrical connections made in an explosion proof installation are made through rigid steel conduit through threaded openings in the back or sides of the enclosure and must comply with the National Electrical Code for installation of equipment in hazardous areas (NEC Article 504, *Intrinsically Safe Systems*).

Connect an electrically separate source of 115 VAC 60HZ to the terminals on the user wiring board marked **L1, L2, GND.**

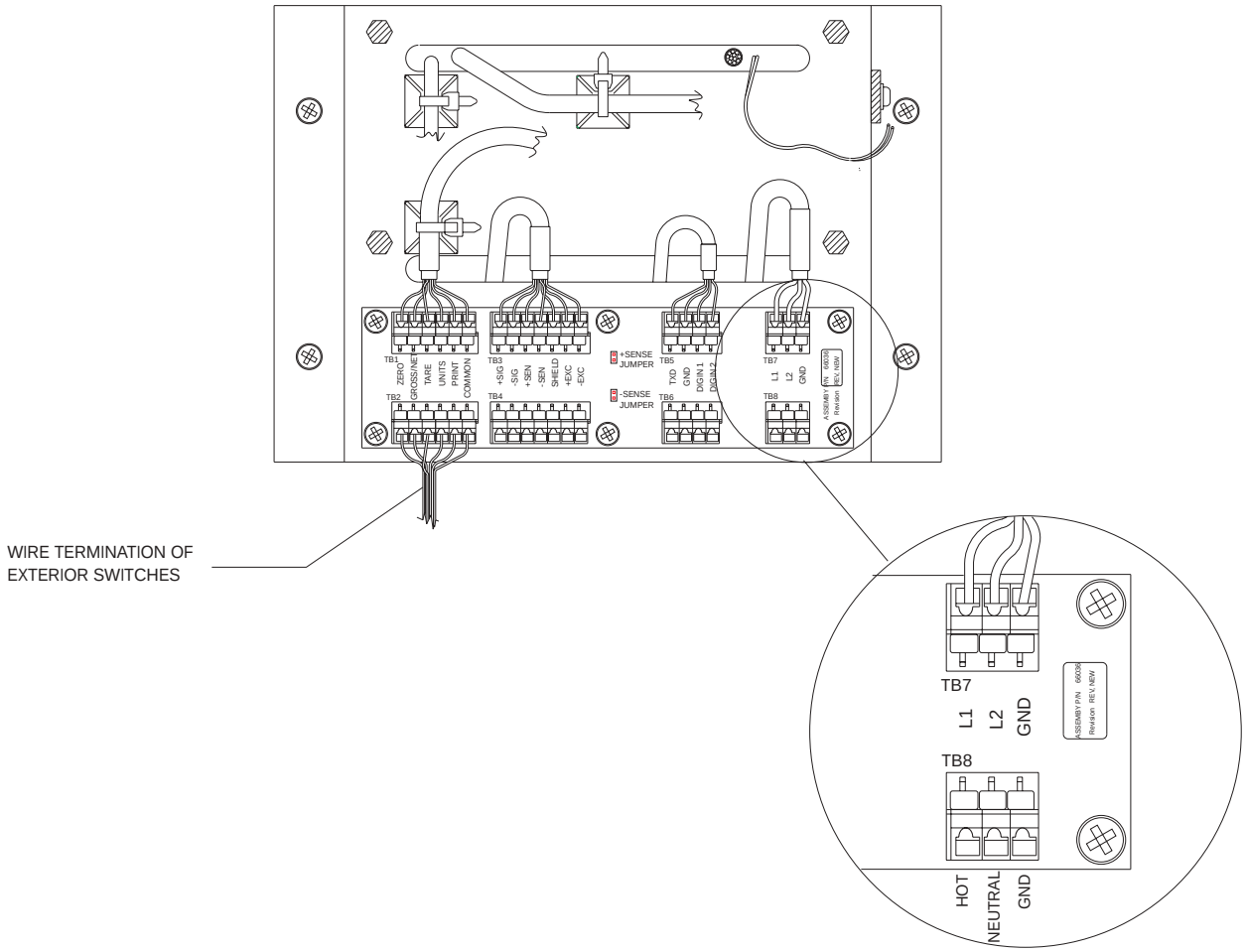


Figure 2-3. AC Power Wiring

Do not apply power at this time.

Recheck all connections and make sure there are no hazards in the surrounding area, and turn on power. The meter should come on and do a normal lamp test.

2.5 Intrinsic Safety Barriers

The IQ plus 310A XPCD is designed to be used by personnel already trained and familiar with intrinsic safety barriers. They are designed to self destruct if a dangerous condition occurs.

Note: *If you are not trained to work on this equipment, stop. Call you scale dealer for assistance.*

All intrinsic safety barriers have five terminals (shown below).

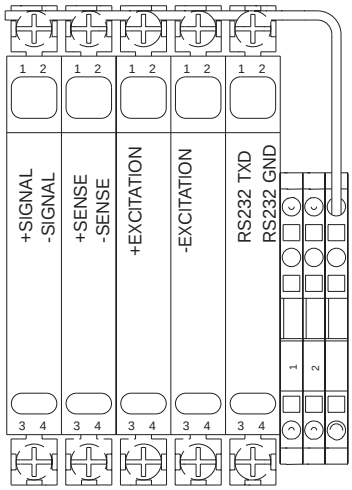


Figure 2-4. Intrinsic Safety Barrier

Terminals three and four are the intrinsically safe connections. Devices in the hazardous location are connected to these terminals. Terminals one and two are the non-intrinsically safe connections for devices within the non-hazardous location. The maximum source voltage applied to these terminals under a fault condition must not exceed 250 V rms.

Along with the four terminals mentioned above, two additional screw terminals are provided, one on each side of the barrier.

They are directly attached to the barrier mounting/grounding system and can be used to establish a redundant ground system or for terminating shields. On single channel barriers they are also internally connected to terminals two and four.

Since a common housing is shared between single, dual, and application dedicated barriers, refer to the schematic printed on the side of each barrier to determine the designation of the floating and grounded terminals.

If an instrinsic safety barrier self destructs, do not replace it. Find out what caused the problem. Do not assume the problem can only be in the indicator.

Only when the problem is corrected should a barrier be replaced with the exact same brand and type.

2.5.1 Intrinsic Safety Grounding

Special attention must be given to the grounding system. Without a proper earth ground system, intrinsic safety barriers will not provide voltage protection. They must therefore be grounded to a designated grounding electrode that references the original power source and instrumentation within the non-hazardous location. This source of ground must be less than 1Ω from the true earth ground.

2.6 Load Cell Wiring

The load cell wiring from the IQ plus 310A has been connected to the intrinsic safety barriers at the factory, (see Figure 2-4). The barriers are located in the bottom of the enclosure.

Wire the load cell cable from the load cell or junction to terminal block TB4 (shown below). If using six-wire load cell cable (with sense wires), remove jumpers JP1 and JP2. For four-wire installation, leave jumpers JP1 and JP2 on.

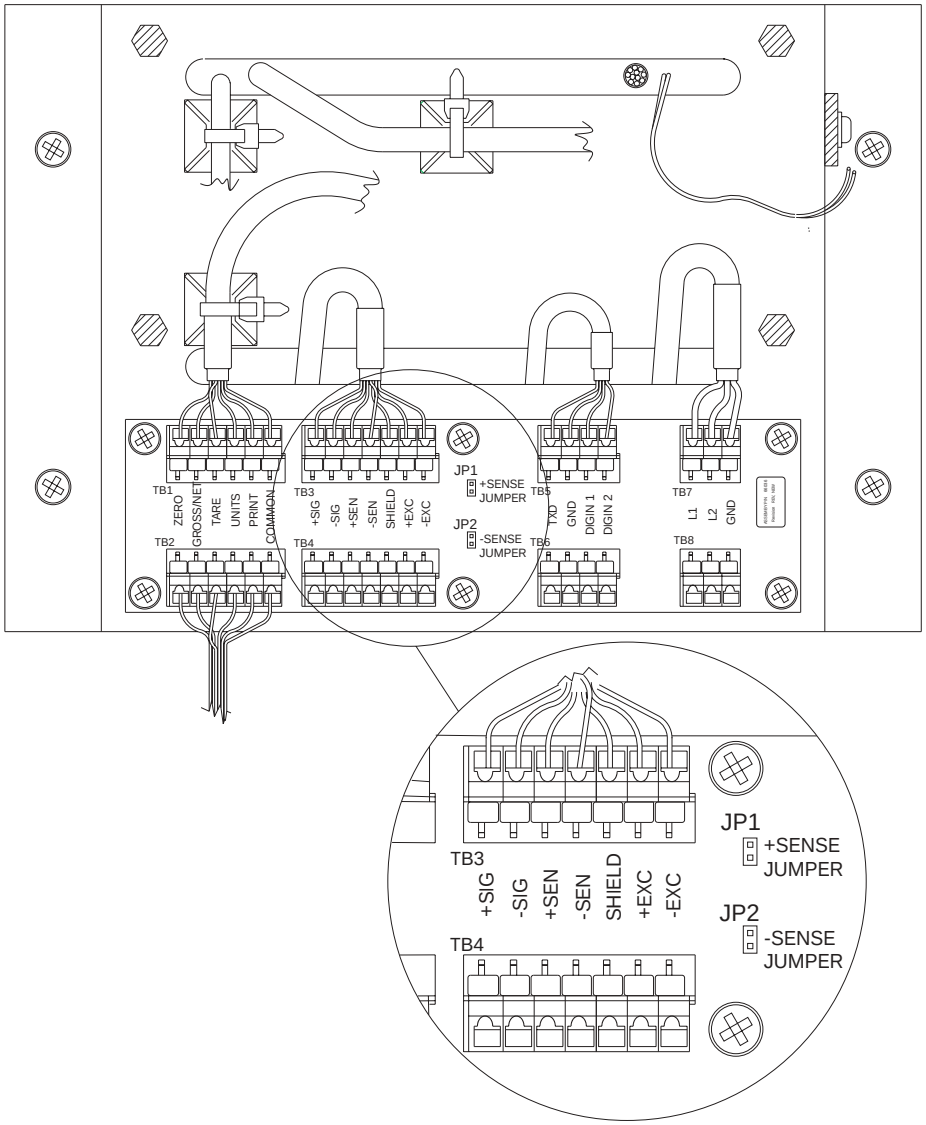


Figure 2-5. Load Cell Wiring

2.7 Serial Communications

The serial communications cable from the IQ plus 310 XPCD has been connected to the intrinsic safety barriers at the factory,(see Figure 2-4). The barriers are located in the bottom of the enclosure.

Wire the serial communications cable to terminal block TB6 (shown below).

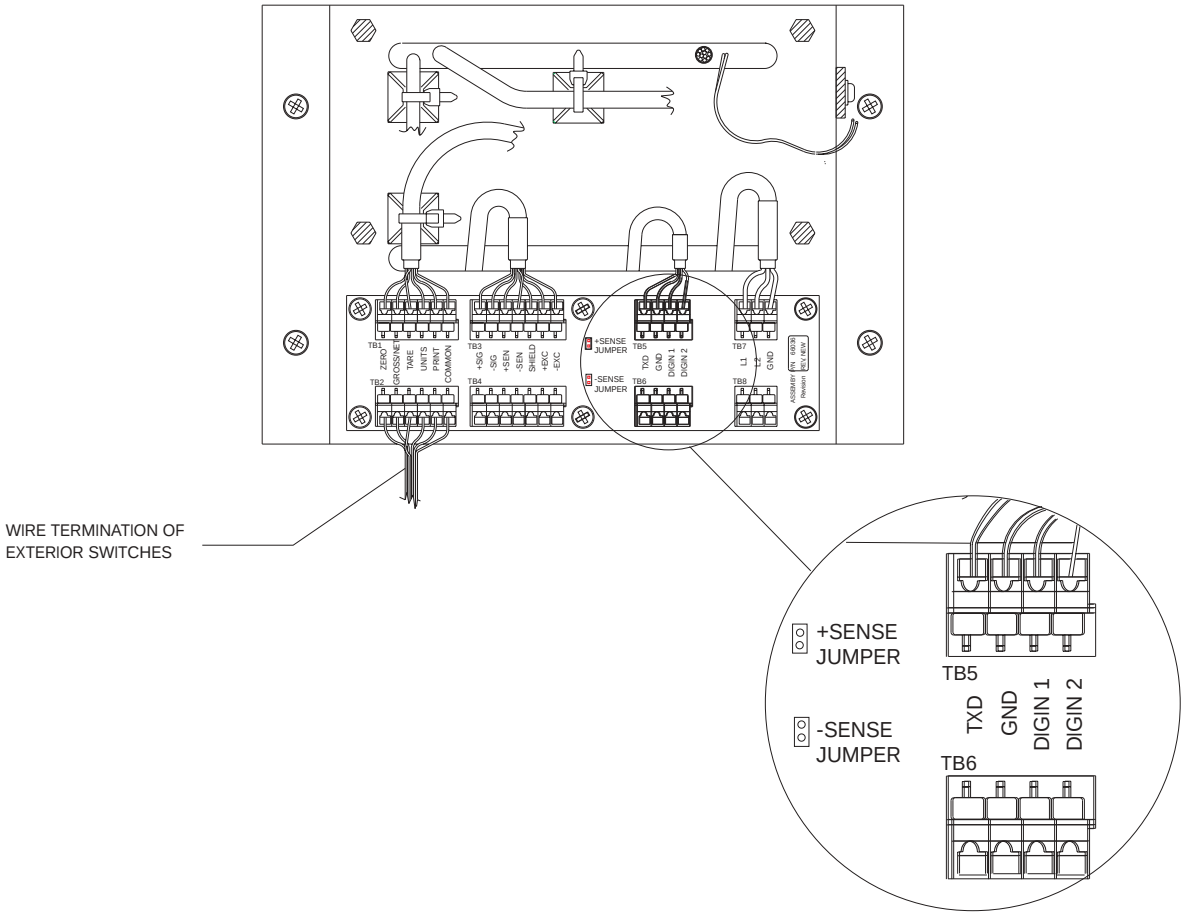


Figure 2-6. Serial Communications Wiring

2.8 Configuration and Setup

The IQ plus 310 XPCD configuration is the same as the normal IQ plus 310A. Please refer to the *IQ plus 310A Installation and Operation manual*, PN 22979 for further details on configuring your indicator.

Enable the configuration parameters by toggling the switch at the top of the indicator mounted inside the enclosure. Configure the indicator at this time.

3.0 Appendix

3.1 Troubleshooting

If any of the following conditions are observed:

- Suspect water or leakage in the enclosure
- A switch gets broken or sheared off
- The glass becomes scratched, cracked, chipped, or pitted.
- A sealing fitting is sheared off or damaged
- The door is hit by a vehicle or object
- If you notice or suspect any damage to the unit

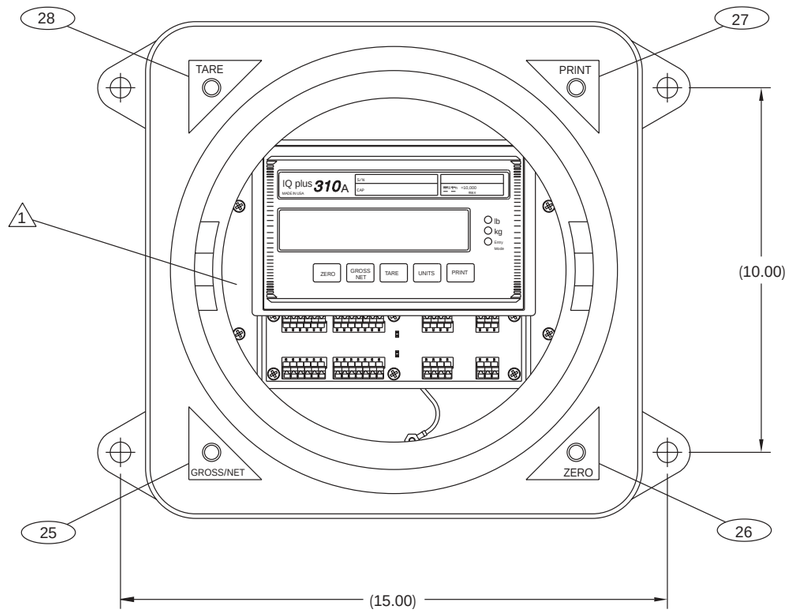
Do the following:

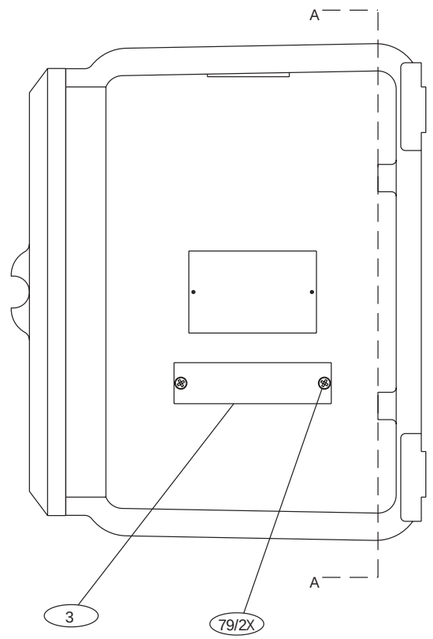
- Clear area of all personnel and notify plant safety
- Shut down all power to the unit at the source and lock out
- When the area has been cleared of the hazard and plant safety has declared the area safe for workers to enter, call your scale dealer
- Do not attempt to restart the unit until all damaged parts have been replaced and the unit has been tested.

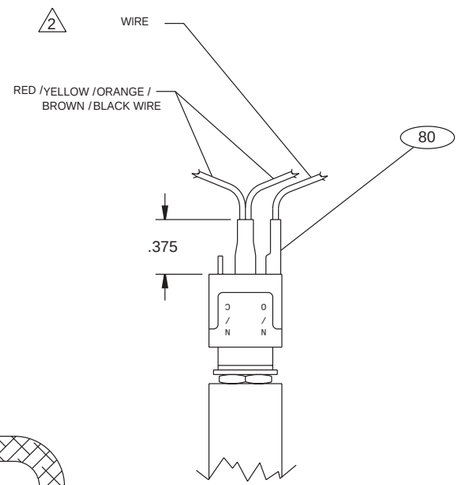
3.2 IQ plus 310 XPCD Schematics

The following fold out pages contain wiring diagrams and system schematics for the IQ plus 310 XPCD indicator.

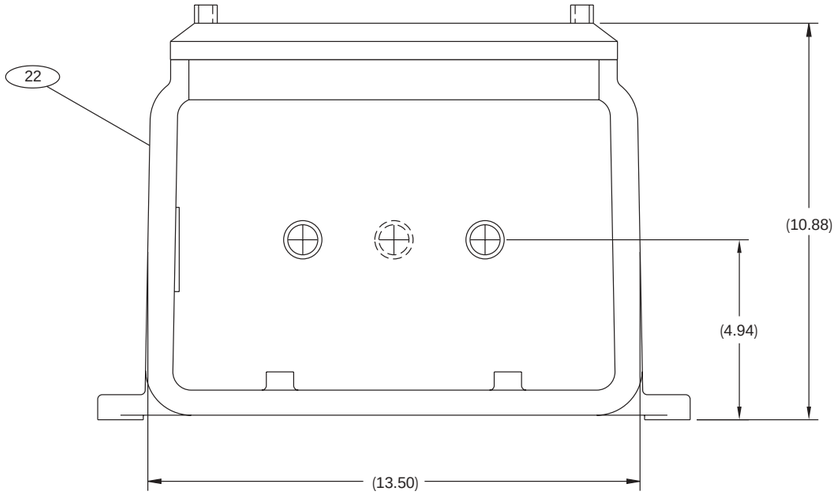
REVISIONS				
REV	REFERENCE	INIT		DATE

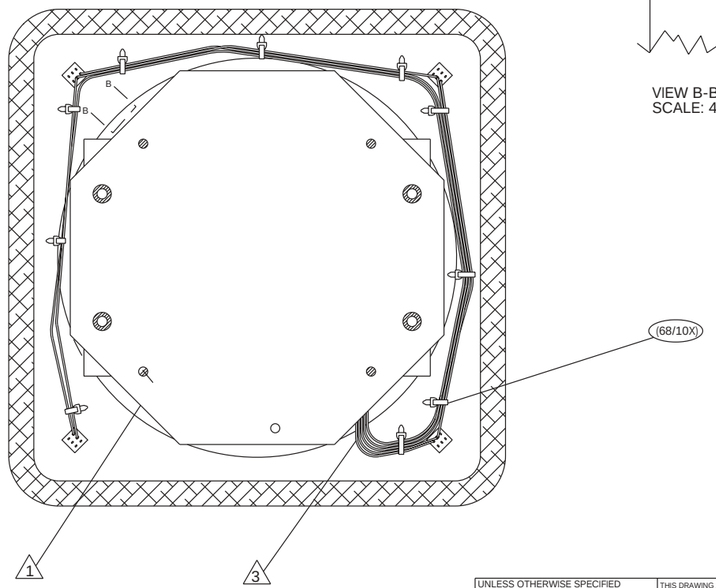






VIEW B-B
SCALE: 4X





NOTES:

1. SEE SHEETS 2, 3, AND 4 FOR INTERIOR ASSEMBLY AND WIRING DETAILS.
2. SEE SHEET 4 FOR WIRE COLOR/SWITCH ASSIGNMENTS.
3. SEE SHEET 2, SECTION VIEW D-D, AND SHEET 4 FOR WIRING DETAILS.

UNLESS OTHERWISE SPECIFIED
UNITS TO BE INCHES
ALL THREADS TO BE CLASS 2

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SEE BILL OF MATERIAL

NONE

IQ+310A XPCD, ASSEMBLY

RICE LAKE WEIGHING SYSTEMS

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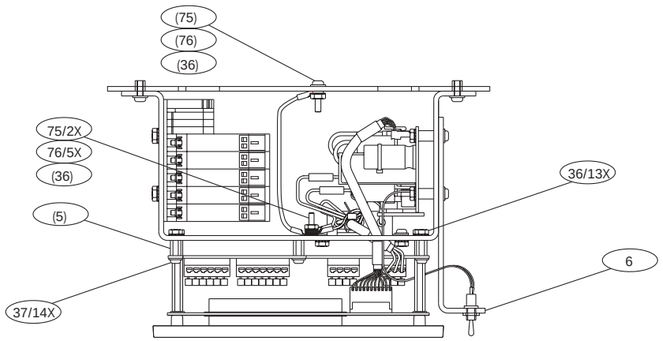
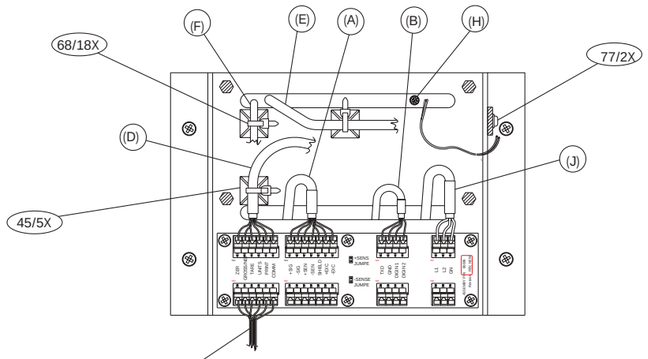
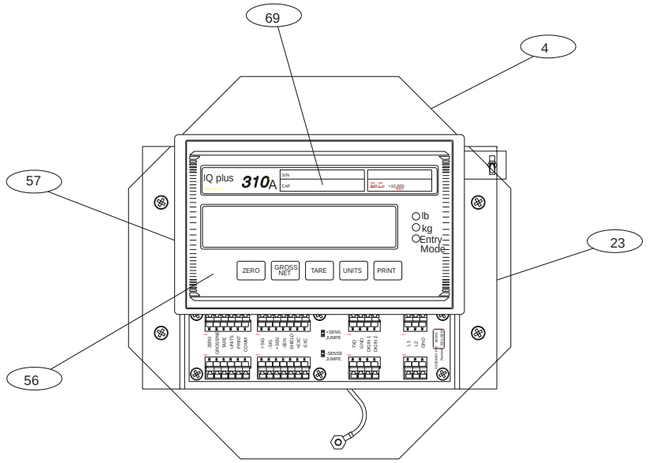
REVISIONS			
REV	REFERENCE	INIT	DATE

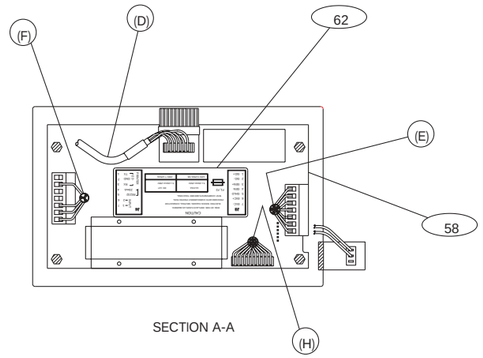




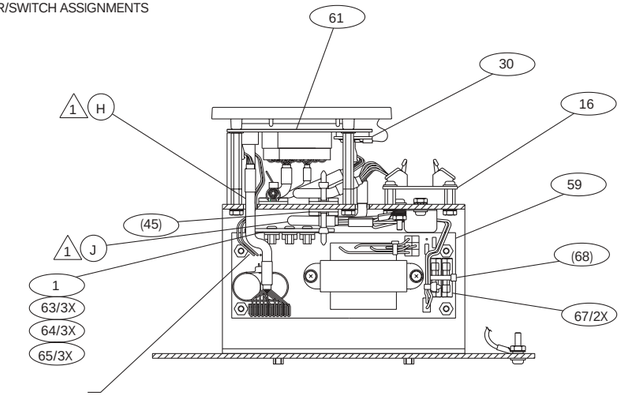
SECTION D-D

WIRE TERMINATION OF EXTERIOR SWITCHES (SECTION VIEW A-A, SHEET 1) SEE SHEET 4 FOR WIRE COLOR/SWITCH ASSIGNMENTS

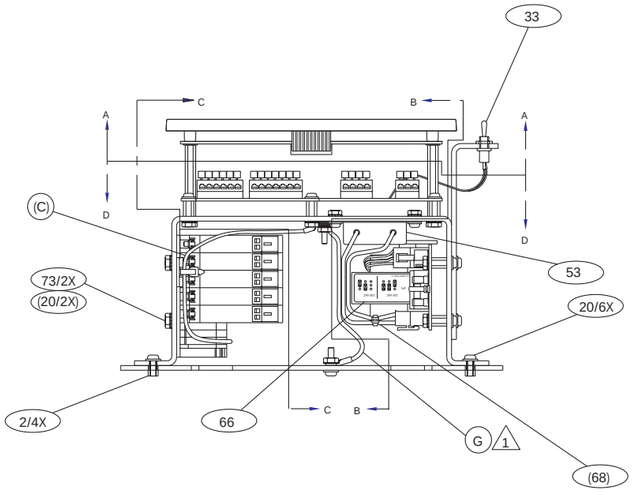


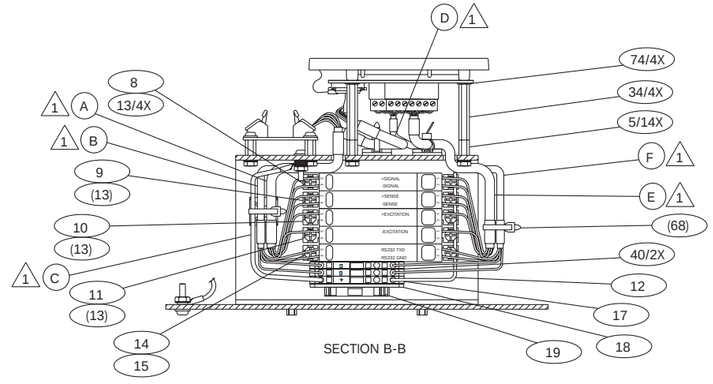


SECTION A-A



SETUP SWITCH, (ITEM 33), WIRE TERMINATION. SEE SHEET 3 FOR SWITCH DETAILS





SECTION B-B

NOTES:

1. SEE SHEETS 3 AND 4 FOR CABLE ASSEMBLY AND WIRING DETAILS.

UNLESS OTHERWISE SPECIFIED
UNITS TO BE INCHES
ALL THREADS TO BE CLASS 2
ALL DIMENSIONS APPLICABLE AFTER TREATMENT

SEE BILL OF MATERIAL

TREATMENT: NONE

THIRD ANGLE PROJECTION

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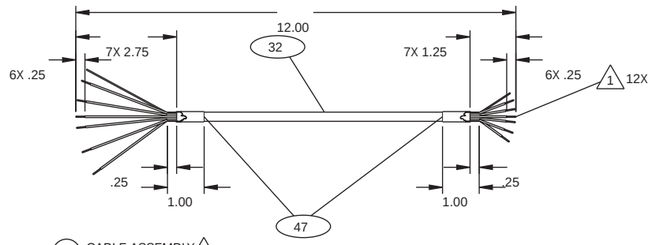
IQ+310A XPCD, ASSEMBLY

RICE LAKE WEIGHING SYSTEMS

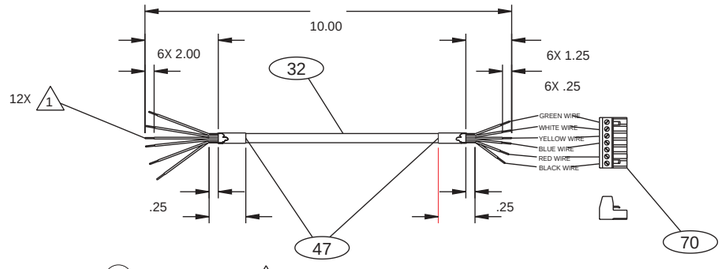
19212

DFH 5/20/02 | 1:2 | 2 4 | NEW

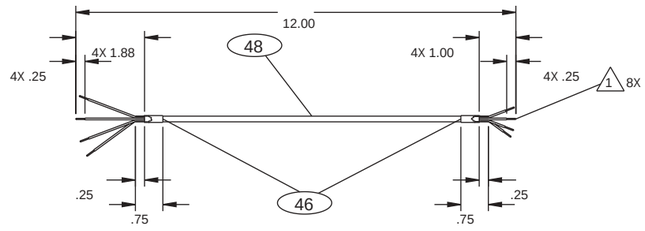
REVISIONS			
REV	REFERENCE	INIT	DATE



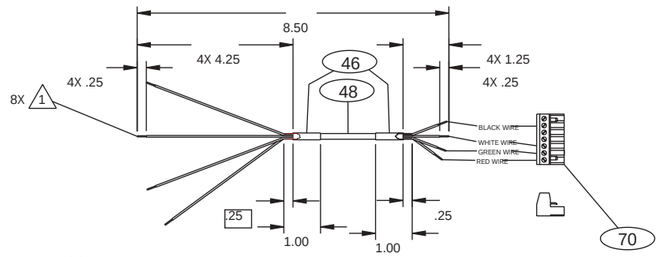
A CABLE ASSEMBLY 4



E CABLE ASSEMBLY 5



B CABLE ASSEMBLY 6



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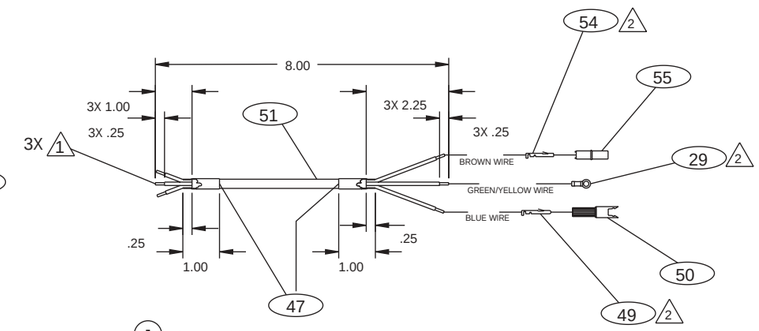
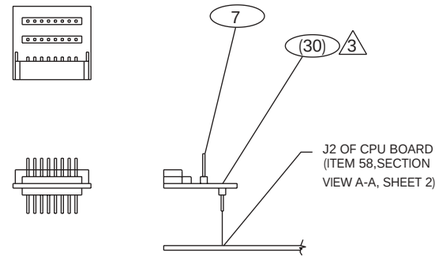
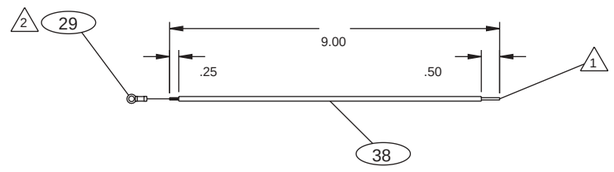


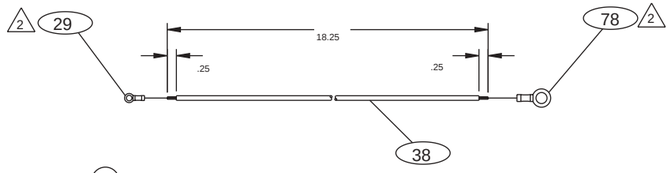
J CABLE ASSEMBLY



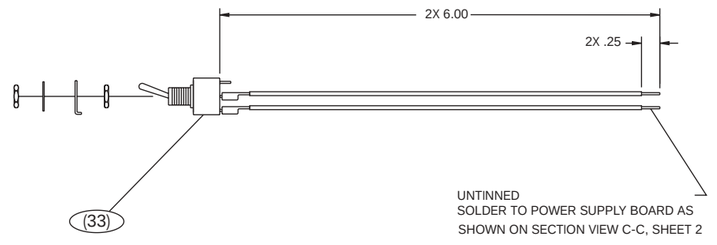
BARE BOARD ASSEMBLY
SCALE: 2X



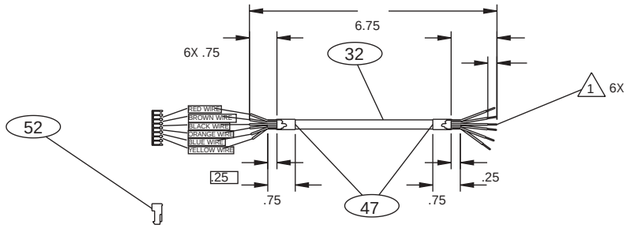
C WIRE ASSEMBLY



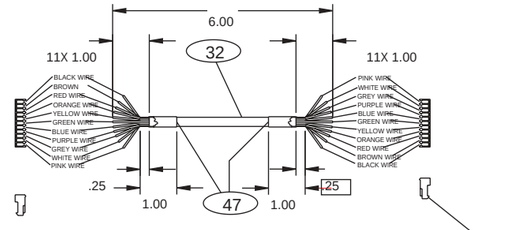
G WIRE ASSEMBLY



SETUP SWITCH ASSEMBLY
SCALE: 2X



D CABLE ASSEMBLY



H CABLE ASSEMBLY 8

NOTES:

1. WIRE END TINNED.
2. CRIMP ON NON-TINNED WIRE END.
3. SOLDER TO CPU BOARD.
4. REMOVE BROWN, ORANGE, PURPLE, GREY, WHITE, AND PINK WIRES FROM BOTH ENDS.
5. REMOVE BROWN, ORANGE, PURPLE, GREY, WHITE, PINK, AND SHIELD WIRES FROM BOTH ENDS.
6. REMOVE SHIELD WIRES FROM BOTH ENDS.
7. REMOVE TAN, PURPLE, GREY, GREEN, WHITE, PINK, AND SHIELD WIRES FROM BOTH ENDS.
8. REMOVE TAN AND SHIELD WIRES FROM BOTH ENDS.

UNLESS OTHERWISE SPECIFIED
UNITS TO BE INCHES
ALL THREADS TO BE CLASS 2
ALL DIMENSIONS APPLICABLE AFTER TREATMENT

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SEE BILL OF MATERIAL
SEE NOTES
DO NOT SCALE DRAWING
FOR RLWS USE ONLY
SURFACE FINISH
DRAWING TOLERANCES
BASIC DIMENSION SPECIFICATION
.XX ±.13
.X ±.060
ANGLE - - -

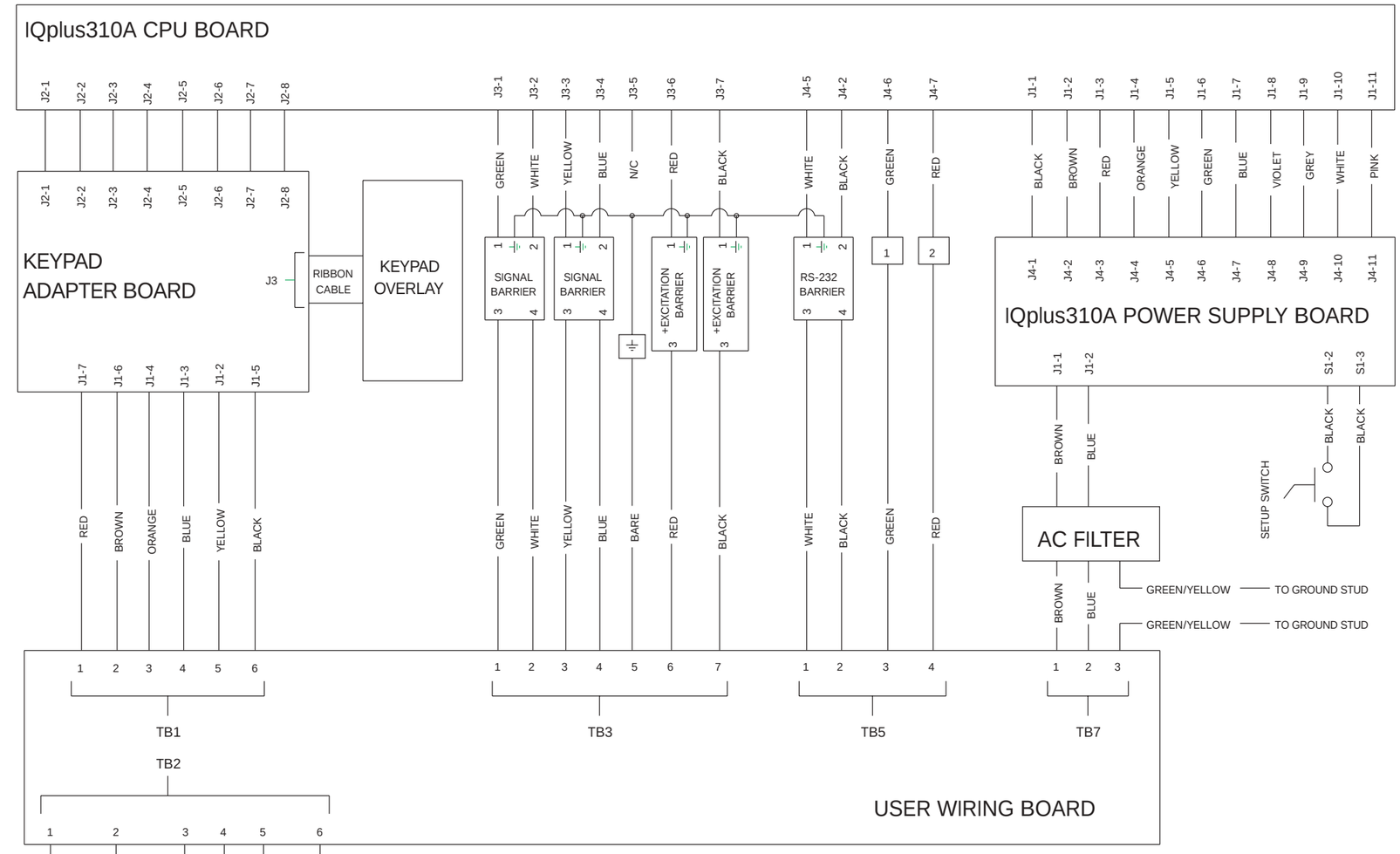
IQ+310A XPCD, ASSEMBLY

RICE LAKE WEIGHING SYSTEMS

DWG NO 19212

DFH 5/22/02 | 1:2 | SHT 3 OF 4 | NEW

REVISIONS			
REV	REFERENCE	INIT	DATE



UNLESS OTHERWISE SPECIFIED
UNITS TO BE IN INCHES
ALL THREAD TO BE CLASS 2
ALL DIMENSIONS APPLICABLE AFTER TREATMENT

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MATERIAL: ---
TREATMENT: ---
DO NOT SCALE DRAWIN
DRAWING TOLERANCES UNLESS OTHERWISE SPECIFIED
FOR RLWS USE ONLY
SURFACE FINISH: ---
TOL. / DECIMAL
2 PLC: ---
3 PLC: ---
ANGL: ---
THIRD ANGLE PROJECTION
MFG.ENG. APPROVED
CKD.
DES.ENG. APPROVED
DR.BY: DFH 5/24/02

TITLE: IQ+310A XPCD, ASSEMBLY WIRING DIAGRAM

[redacted] RICE LAKE WEIGHING SYSTEMS

DWG NO: 19212
SCALE: N/A
SHEET 4 OF 4
REVISION: NEW

IQ plus 310A XPCD Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for one year.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such nonconformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, *Protecting Your Components From Static Damage in Shipment*, available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

THESE WARRANTIES EXCLUDE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NEITHER RLWS NOR DISTRIBUTOR WILL, IN ANY EVENT, BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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SHOULD THE SELLER BE OTHER THAN RLWS, THE BUYER AGREES TO LOOK ONLY TO THE SELLER FOR WARRANTY CLAIMS.

NO TERMS, CONDITIONS, UNDERSTANDING, OR AGREEMENTS PURPORTING TO MODIFY THE TERMS OF THIS WARRANTY SHALL HAVE ANY LEGAL EFFECT UNLESS MADE IN WRITING AND SIGNED BY A CORPORATE OFFICER OF RLWS AND THE BUYER.

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